## ANNEX 1

## AGENDA FOR THE FORTY-FIRST SESSION AND LIST OF DOCUMENTS

**1 Adoption of the agenda**

| | | |
|---|---|---|
| SLF 41/1 and Corr.1 | Secretariat | Provisional agenda |
| SLF 41/1/1 | Secretariat | Annotations to the provisional agenda |

**2 Decisions of other IMO bodies**

| | | |
|---|---|---|
| SLF 41/2 | Secretariat | Decisions by FP 41, MSC 67, FSI 5 and DE 40 |
| SLF 41/2/1 | Secretariat | Decisions by MEPC 39 and MSC 68 |

**3 Review of the Intact Stability Code**

| | | |
|---|---|---|
| SLF 41/3 | Chairman of IS WG | Report of the IS WG at SLF 40 |
| SLF 41/3/1 | Germany | Amended ch.2 of, and new annex 3 to, the IS Code |
| SLF 41/3/2 | Norway | Report of the correspondence group |
| SLF 41/3/3 | BIMCO | Amendments to IS Code ch.7 |
| SLF 41/3/4 | Poland | Corrections to IS Code chs. 1 and 2 |
| SLF 41/3/5 | Poland | Revised section 3.3 of the IS Code |
| SLF 41/3/6 | Japan | Comments on SLF 41/3/2 |
| SLF 41/INF.6 | Germany | Management of ship's stability |
| SLF 41/WP.4 | Working group | Report of the working group |

**4 Explanatory notes for cargo ships of less than 100 m in length**

| | | |
|---|---|---|
| SLF 41/WP.1 | Working group | Report of the working group |

**5 Development of revised SOLAS chapter II-1 parts A, B and B-1**

| | | |
|---|---|---|
| SLF 41/5 | Chairman of SDS WG | Report of the SDS WG at SLF 40 |
| SLF 41/5/1 | Netherlands | Intermediate stages of flooding |
| SLF 41/5/2 | United Kingdom | Effect of trim on index A |
| SLF 41/5/3 | Sweden and United States | Report of the correspondence group |
| SLF 41/5/4 | Japan | Comments on draft part B of SOLAS ch.II-1 |
| SLF 41/5/5 | Norway | Outline of revised SOLAS ch.II-1 |
| SLF 41/5/6 | Norway | Comments on annex 2 to SLF 41/5/3 |
| SLF 41/5/7 | United States | Analysis of calculation procedure for index A |
| SLF 41/5/8 | Norway | Comments on SLF 41/5/3 |
| SLF 41/INF.3 | Netherlands | Intermediate stages of flooding |
| SLF 41/INF.5 | Sweden | Background and summary discussion leading to proposed $p_i$ factor |
| SLF 41/INF.8 | Poland | Some practical aspects of calculating $s_i$ factor |

| | | |
|---|---|---|
| SLF 41/WP.1 | Working group | Report of the working group |

**6 Revision of technical regulations of the 1966 LL Convention**

| | | |
|---|---|---|
| SLF 41/6 | Chairman of LL WG | Report of LL WG at SLF 40 |
| SLF 41/6/1 | China | Proposals based on results of study on reviewing freeboards of ICLL |
| SLF 41/6/2 | Netherlands | Report of the correspondence group |
| SLF 41/6/3 | IACS | Revision of reg. 23 - Side scuttles |
| SLF 41/6/4 | IACS | Revision of reg. 17 - Machinery space openings |
| SLF 41/6/5 | IACS | Revision of reg. 24 - Freeing ports |
| SLF 41/6/6 | IACS | IACS Unified Interpretations of ICLL |
| SLF 41/6/7 | Germany | Systematic freeboard estimation |
| SLF 41/6/8 | Norway | Comments on SLF 41/6/2 |
| SLF 41/6/9 | Poland | Research project |
| SLF 41/INF.2 | China | Information for proposals on freeboard, bow height and sheer |
| SLF 41/INF.11 | Netherlands | Results of systematic calculations |
| SLF 41/WP.5 | Working group | Report of the Working group |

**7 Revision of the fishing vessel safety Code and voluntary Guidelines**

| | | |
|---|---|---|
| MSC 68/INF.10 | Japan | Report on the Conference adopting Guidelines for the safety of fishing vessels operating in the East and South-East Asia region |
| SLF 41/INF.7 | Iceland | Study on intact stability of fishing vessels |

**8 Guidelines for shipboard loading and stability computer programs**

No documents submitted to the session

**9 Guidelines for damage control plans**

| | | |
|---|---|---|
| SLF 41/9 | Russian Federation | Comments on the draft guidelines |
| SLF 41/9/1 | Denmark | Colours indicating the survivability after damage |
| SLF 41/WP.6 | Drafting group | Report of the drafting group |

**10 Revision of the HSC Code**

| | | |
|---|---|---|
| SLF 41/10 | China | Proposals on revision of HSC Code ch.2 |
| SLF 41/10/1 | United Kingdom | Report of the correspondence group |
| SLF 41/10/2 | Norway | Comments on SLF 41/10/1 |

**11 Model stability booklets and loading manuals**

| | | |
|---|---|---|
| SLF 41/11 | Germany | Draft model stability booklet |

**12 Requirements for existing one-compartment-standard passenger ships carrying 400 persons or more**

No documents submitted to the session

**13 Harmonization of damage stability provisions in other IMO instruments, including the 1993 Torremolinos Protocol**

No documents submitted to the session

**14 Feasibility of regulations for cargo ships of less than 80 m in length**

No documents submitted to the session

**15 Election of Chairman and Vice-Chairman for 1999**

**16 Work programme and agenda for SLF 42**

| | | |
|---|---|---|
| SLF 41/WP.3 | Chairman | Revised work programme and provisional agenda for SLF 42 |

**17 Any other business**

| | | |
|---|---|---|
| MSC 67/19/10 | Ireland | Location of collision bulkhead on ro-ro ships |
| SLF 41/INF.4 | United Kingdom | Analysis of damage cards |
| SLF 41/INF.9 | IACS | Application of MSC/Circ.650 to existing ships |
| SLF 41/INF.10 | IACS | IACS Unified Interpretation LL 50/Rev.2 - "Protection of crew" |
| SLF 41/WP.2 | Ireland | Interpretation of the position of the forward perpendicular |

**18 Report to the Maritime Safety Committee**

| | | |
|---|---|---|
| SLF 41/WP.7 | | Draft report |
| SLF 41/18 | | Report |

**ANNEX 2**

**DRAFT RESOLUTION MSC.[ ](69)**
**(adopted on [ 1998])**

**ADOPTION OF AMENDMENTS TO THE CODE ON INTACT STABILITY FOR ALL TYPES OF SHIPS COVERED BY IMO INSTRUMENTS (RESOLUTION A.749(18))**

THE MARITIME SAFETY COMMITTEE,

RECALLING Article 28(b) of the Convention on the International Maritime Organization concerning the functions of the Committee,

RECALLING ALSO resolution A.749(18), by which the Assembly, at its eighteenth session, adopted the Code on Intact Stability for All Types of Ships Covered by IMO Instruments (IS Code),

NOTING that the Assembly authorized the Committee to amend the Code as necessary in the light of further studies and experience gained from the implementation of the provisions contained therein,

DESIRING to keep the IS Code up to date,

HAVING CONSIDERED, at its [sixty-ninth session], the amendments to the IS Code proposed by the Sub-Committee on Stability and Load Lines and on Fishing Vessels Safety, at its forty-first session,

1. ADOPTS amendments to the Code on Intact Stability for All Types of Ships Covered by IMO Instruments (resolution A.749(18)), the text of which is set out in the Annex to the present resolution;

2. RECOMMENDS Governments to implement the annexed amendments to the IS Code.

ANNEX

# AMENDMENTS TO THE CODE ON INTACT STABILITY FOR ALL TYPES OF SHIPS COVERED BY IMO INSTRUMENTS (RESOLUTION A.749(18))

## CONTENTS

1 In paragraph 3.3, the word "surface" is replaced by the word "surfaces".

2 In paragraph 5.2, the word "cargo" is replaced by the word "cargoes".

3 In paragraph 7.3, the word "preparation" is replaced by the word "preparations".

## PREAMBLE

4 In paragraph 1, in the second sentence, the word "with" is replaced by the word "from".

5 In paragraph 3, in the third sentence, the word "environment" is replaced by the word "environmental".

## CHAPTER 1 - GENERAL

### 1.2 Application

6 In paragraph 1.2.1, the word "containerships" is replaced by the words "cargo ships carrying containers on deck and containerships".

7 In paragraph 1.2.2, the words "The coastal State" are replaced by the word "Administrations".

### 1.3 Definitions

8 In paragraph 1.3.7.2, the word "ship" is replaced by the word "ship-".

9 A new paragraph 1.3.9 is inserted as follows:

"*A high-speed craft* is a craft capable of a maximum speed, in metres per second (m/s), equal to or exceeding:

$$3.7\nabla^{0.1667}$$

where: $\nabla$ = displacement corresponding to the design waterline ($m^3$)."

10 Existing paragraphs 1.3.9 to 1.3.13 are renumbered as paragraphs 1.3.10 to 1.3.14.

11 The following new paragraphs 1.3.15, 1.3.16 and 1.3.17 are added after renumbered paragraph 1.3.14:

"1.3.15 *Length of ship*. The length should be taken as 96% of the total length on a waterline at 85% of the least moulded depth measured from the top of the keel, or as the length from the fore side of the stem to the axis of the rudder stock on the waterline, if that be greater. In ships designed with a rake of keel the waterline on which this length is measured should be parallel to the designed waterline.

1.3.16 *A moulded breadth* is the maximum breadth of the ship measured amidships to the moulded line of the frame in a ship with a metal shell and to the outer surface of the hull in a ship with a shell of any other material.

1.3.17 *A moulded depth* is the vertical distance measured from the top of the keel to the top of the freeboard deck beam at side. In wood and composite ships, the distance is measured from the lower edge of the keel rabbet. Where the form at the lower part of the midship section is of a hollow character, or where thick garboards are fitted, the distance is measured from the point where the line of the flat of the bottom continued inwards cuts the side of the keel.

In ships having rounded gunwales, the moulded depth should be measured to the point of intersection of the moulded lines of the deck and side shell plating, the lines extending as though the gunwale were of angular design.

Where the freeboard deck is stepped and the raised part of the deck extends over the point at which the moulded depth is to be determined, the moulded depth should be measured to a line of reference extending from the lower part of the deck along a line parallel with the raised part."

## CHAPTER 2 - GENERAL PROVISIONS AGAINST CAPSIZING AND INFORMATION FOR THE MASTER

### 2.1 Stability booklet

12 The existing text of paragraphs 2.1.1 and 2.1.2 is replaced by the following:

"2.1.1 Stability data and associated plans should be drawn up in the working language of the ship and any other language the Administration may require. Reference is also made to the International Safety Management (ISM) Code, adopted by the Organization by resolution A.741(18). All translations of the stability booklet should be approved.

2.1.2 Each ship should be provided with a stability booklet, approved by the Administration, which contains sufficient information to enable the master to operate the ship in compliance with the applicable requirements contained in the Code. The Administration may have additional requirements. On a mobile offshore drilling unit, the stability booklet may be referred to as an operating manual. The stability booklet may include information on longitudinal strength. This Code addresses only the stability-related contents of the booklet."

13 In paragraph 2.1.4, the word "as" is inserted between the words "Code" and "may" and the word "authority" is replaced by the word "Administration".

14 After paragraph 2.1.4, a new heading and relevant footnote are added as follows:

**"2.2 Stability calculation by computer[1]**

_____

[*]Refer to the Guidelines for shipboard loading and stability computer programs, to be developed by the Organization."

15 Existing paragraphs 2.1.5 to 2.1.8 are replaced by new paragraphs 2.2.1 to 2.2.4 as follows:

"2.2.1 As a supplement to the approved stability booklet, a computer may be used to facilitate the stability calculations mentioned in 2.1.3.9.

2.2.2 The computer hardware and software should be approved for stability calculation by the Administration. The input/output format should, as far as practicable, be easily comparable in information and format to the stability booklet so that the operators will easily gain familiarity with the stability calculations.

2.2.3 A simple and straightforward instruction manual written in the same language as the stability booklet, complying with provision 2.1.1 of this chapter, should be provided.

2.2.4 In order to validate the proper functioning of the computer hardware and software, pre-defined standard loading conditions should be run in the computer periodically, at intervals recommended by the suppliers but at least at every annual load line inspection, and the printout should be maintained on board as check conditions for future reference."

**2.2 Operating booklets for certain ships**

16 Section 2.2 is renumbered as section 2.3.

17 The existing paragraph under the heading of this section is numbered as paragraph 2.3.1.

18 New paragraphs 2.3.2 and 2.3.3 and relevant footnote are added after paragraph 2.3.1 as follows:

"2.3.2 For double hull oil tankers of single cargo tank across design, an operation manual for loading and unloading cargo oil should be provided, including operational procedures of loading and unloading cargo oil and detailed data of the initial metacentric height of the oil tanker and that of free surface correction of liquids in cargo oil tanks and ballast tanks during loading and

unloading cargo oil (including ballasting and discharging) and cargo oil washing of tanks.[1]

2.3.3 The stability booklet of ro-ro passenger ships should contain information concerning the importance of securing and maintaining all closures watertight due to the rapid loss of stability which may result when water enters the vehicle deck and the fact that capsize can rapidly follow.

19 Existing section 2.4 is inserted after the renumbered section 2.3 with the heading and text amended as follows:

"**2.4 Permanent ballast**

2.4.1 If used, permanent ballast should be located in accordance with a plan approved by the Administration and in a manner that prevents shifting of position. Permanent ballast should not be removed from the ship or relocated within the ship without the approval of the Administration. Permanent ballast particulars should be noted in the ship's stability booklet."

**2.3 General precautions against capsizing**

20 Existing section 2.3 is renumbered as section 2.5.

21 Existing paragraphs 2.3.1 to 2.3.7 are renumbered as paragraphs 2.5.1 to 2.5.7.

22 In the renumbered paragraph 2.5.1, an asterisk and relevant footnote are added as follows:

_____

" * Refer to the Guidance to the master for avoiding dangerous situations in following and quartering seas (MSC/Circ.707)."

23 In the renumbered paragraph 2.5.3, an asterisk and relevant footnote are added as follows:

_____

" * Refer to the Guidelines for the preparation of the Cargo Securing Manual (MSC/Circ.745)."

24 The existing text of the renumbered paragraph 2.5.4 is replaced by the following:

"2.5.4 A ship, when engaged in towing operations, should possess an adequate reserve of stability to withstand the anticipated heeling moment arising from the tow line without endangering the towing ship. Deck cargo on board the towing ship should be so positioned as not to endanger the safe working of the crew on deck or impede the proper functioning of the towing equipment and be properly secured. Tow line arrangements should include towing springs and a method of quick release of the tow."

25 In the numbered paragraph 2.5.6, the following is added after the last sentence:

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[1]Refer to the Guidance on intact stability of existing tankers during liquid transfer operations (MSC/Circ.706/MEPC/Circ.304)."

"Slack tanks may, in exceptional cases, be used as a means of reducing excessive values of metacentric height. In such cases, due consideration should be given to sloshing effects."

**2.5 Operational procedures related to weather conditions**

26 Existing section 2.5 is renumbered as section 2.6 and the heading is replaced by the following:

**"2.6 Operational procedures before and in heavy weather "**

27 Existing paragraphs 2.5.1 to 2.5.12 are renumbered as paragraphs 2.6.1 to 2.6.12.

28 In the renumbered paragraph 2.6.8, an asterisk and relevant footnote are added as follows:

_____

" * Refer to the Guidance to the master for avoiding dangerous situations in following and quartering seas (MSC/Circ. 707)."

29 In the numbered paragraph 2.6.9, in the first sentence, the word "the" is inserted between "or" and "course".

30 The existing text of the renumbered paragraph 2.6.12 is replaced by the following:

"2.6.12 Dynamically supported craft and high-speed craft should not be intentionally operated outside the worst intended conditions and limitations specified in the relevant certificates, or in documents referred to therein."

**CHAPTER 3 - DESIGN CRITERIA APPLICABLE TO ALL SHIPS**

**3.1.2 Recommended general criteria**

31 In paragraph 3.1.2.1, in the first sentence, the words "angle of flooding" are replaced by the words "angle of downflooding".

32 In paragraph 3.1.2.6, the reference in the formula to "0.02" is replaced by the reference "0.196", the reference in the definition of $M_R$ to "metre-tonnes" is replaced by the reference "kNm" and in the definition of KG, the word "keel" is replaced by the word "baseline".

**3.2.2. Recommended weather criteria**

33 In paragraph 3.2.2.2, in the definition of Z, the word "draught" is replaced by the words "mean draught", in the definition of P, the reference to "504 $N/m^2$" is replaced by the words "wind pressure of 504 Pa" and in the definition of g, the reference to "9.81 $m/s^2$" is replaced by "gravitational acceleration of 9.81 $m/s^2$".

34 In paragraph 3.2.2.3, in the definition of L, the words "waterline length of the ship (m)" are replaced by the words "length of the ship at waterline (m)".

### 3.3 Effect of free surfaces of liquids in tanks

35 The existing text of section 3.3 is replaced by the following:

"3.3.1 For all loading conditions, the initial metacentric height and the righting lever curve should be corrected for the effect of free surfaces of liquids in tanks.

3.3.2 Free surface effects should be considered whenever the filling level in a tank is less than 98% of full condition. Free surface effects need not be considered where a tank is nominally full, i.e. filling level is 98% or above. Free surface effects for small tanks may be ignored under condition 3.3.9.*

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* Refer to the intact stability design criteria, contained in MARPOL regulation I/25A, together with the associated Unified Interpretations.

3.3.3 Tanks which are taken into consideration when determining the free surface correction may be in one of two categories:

.1 Tanks with filling levels fixed (e.g. liquid cargo, water ballast). The free surface correction should be defined for the actual filling level to be used in each tank.

.2 Tanks with filling levels variable (e.g. consumable liquids such as fuel oil, diesel oil, and fresh water, and also liquid cargo and water ballast during liquid transfer operations). Except as permitted in 3.3.5 and 3.3.6, the free surface correction should be the maximum value attainable between the filling limits envisaged for each tank, consistent with any operating instructions.

3.3.4 In calculating the free surface effects in tanks containing consumable liquids, it should be assumed that for each type of liquid at least one transverse pair or a single centreline tank has a free surface and the tank or combination of tanks taken into account should be those where the effect of free surfaces is the greatest.

3.3.5 Where water ballast tanks, including anti-rolling tanks and anti-heeling tanks, are to be filled or discharged during the course of a voyage, the free surface effects should be calculated to take account of the most onerous transitory stage relating to such operations.

3.3.6 For ships engaged in liquid transfer operations, the free surface corrections at any stage of the liquid transfer operations may be determined in accordance with the filling level in each tank at that stage of the transfer operation.

3.3.7 The corrections to the initial metacentric height and to the righting lever curve should be addressed separately as follows.

3.3.7.1 In determining the correction to initial metacentric height, the transverse moments of inertia of the tanks should be calculated at 0° angle of heel according to the categories indicated in 3.3.3.

3.3.7.2 The righting lever curve may be corrected by any of the following methods subject to the agreement of the Administration:

.1 Correction based on the actual moment of fluid transfer for each angle of heel calculated.

.2 Correction based on the moment of inertia, calculated at 0° angle of heel, modified at each angle of heel calculated.

.3 Correction based on the summation of $M_{fs}$ values for all tanks taken into consideration (see 3.3.8).

With the exception of .3 above, corrections may be calculated according to the categories indicated in 3.3.3.

Whichever method is selected for correcting the righting lever curve, only that method should be presented in the ship's stability booklet. However, where an alternative method is described for use in manually calculated loading conditions, an explanation of the differences which may be found in the results, as well as an example correction for each alternative, should be included.

3.3.8 The values of $M_{fs}$, for each tank may be derived from the formula:

$$M_{fs} = v\ b\ \varrho\ k\ \sqrt{\delta}$$

where:

$M_{fs}$ is the free surface moment at any inclination, in m.tonnes
v is the tank total capacity, in $m^3$
b is the tank maximum breadth, in m
$\varrho$ is the mass density of liquid in the tank, in tonnes/$m^3$
$\delta$ is equal to v/blh (the tank block coefficient)
h is the tank maximum height, in m
1 is the tank maximum length, in m
k is the dimensionless coefficient to be determined from the following table 3.3.8 according to the ratio b/h. The intermediate values are determined by interpolation.

3.3.9 Small tanks which satisfy the following condition using the values of "k" corresponding to an angle of inclination of 30°, need not be included in the correction:

$$M_{fs} / \Delta_{min} < 0.01\ m$$

where:

$\Delta_{min}$ is the minimum ship displacement calculated at $d_{min}$, in tonnes

$d_{min}$ is the minimum mean service draught of the ship without cargo, with 10%

stores and minimum water ballast, if required, in m.

3.3.10 The usual remainder of liquids in empty tanks need not be taken into account in calculating the corrections provided that the total of such residual liquids does not constitute a significant free surface effect.

**Table 3.3.8 - Values for coefficient "k"
for calculating free surface corrections**

$k = \frac{\sin\theta}{\cos\theta}\left(1 + \frac{\tan^2\theta}{2}\right) \cdot \frac{b}{h}$

$k = \frac{12}{8}\left(1 + \frac{\tan\theta}{b/h}\right) - \frac{h\cos\theta}{12(b/h)^2}\left(1 + \frac{\cot^2}{2}\right)$

where $\cot\theta \geq {}^{b}/_{h}$ where $\cot\theta < {}^{b}/_{h}$

| θ / *b/h* | 5° | 10° | 15° | 20° | 30° | 40° | 45° | 50° | 60° | 70° | 75° | 80° | 85° | θ / *b/h* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **20** | 0.11 | 0.12 | 0.12 | 0.12 | 0.11 | 0.10 | 0.09 | 0.09 | 0.09 | 0.05 | 0.04 | 0.03 | 0.02 | **20** |
| **10** | 0.07 | 0.11 | 0.12 | 0.12 | 0.11 | 0.10 | 0.10 | 0.09 | 0.07 | 0.05 | 0.04 | 0.03 | 0.02 | **10** |
| **5** | 0.04 | 0.07 | 0.10 | 0.11 | 0.11 | 0.11 | 0.10 | 0.10 | 0.08 | 0.07 | 0.06 | 0.05 | 0.04 | **5** |
| **3** | 0.02 | 0.04 | 0.07 | 0.09 | 0.11 | 0.11 | 0.11 | 0.10 | 0.09 | 0.08 | 0.07 | 0.06 | 0.05 | **3** |
| **2** | 0.01 | 0.03 | 0.04 | 0.06 | 0.09 | 0.11 | 0.11 | 0.11 | 0.10 | 0.09 | 0.09 | 0.08 | 0.07 | **2** |
| **1.5** | 0.01 | 0.02 | 0.03 | 0.05 | 0.07 | 0.10 | 0.11 | 0.11 | 0.11 | 0.11 | 0.10 | 0.10 | 0.09 | **1.5** |
| **1** | 0.01 | 0.01 | 0.02 | 0.03 | 0.05 | 0.07 | 0.09 | 0.10 | 0.12 | 0.13 | 0.13 | 0.13 | 0.13 | **1** |
| **0.75** | 0.01 | 0.01 | 0.01 | 0.02 | 0.02 | 0.04 | 0.04 | 0.05 | 0.09 | 0.16 | 0.18 | 0.21 | 0.16 | **0.75** |
| **0.5** | 0.00 | 0.01 | 0.01 | 0.02 | 0.02 | 0.04 | 0.04 | 0.05 | 0.09 | 0.16 | 0.18 | 0.21 | 0.23 | **0.5** |
| **0.3** | 0.00 | 0.00 | 0.01 | 0.01 | 0.01 | 0.02 | 0.03 | 0.03 | 0.05 | 0.11 | 0.19 | 0.27 | 0.34 | **0.3** |
| **0.2** | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.01 | 0.02 | 0.02 | 0.04 | 0.07 | 0.13 | 0.27 | 0.45 | **0.2** |
| **0.1** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.01 | 0.02 | 0.04 | 0.06 | 0.14 | 0.53 | **0.1** |

"

### 3.5 Standard conditions of loading to be examined

36 In the heading of section 3.5, the words "conditions of loading" are replaced by the words "loading conditions".

### 3.5.1 Loading conditions

38 In paragraphs 3.5.1.3.1 and 3.5.1.3.2, the word "weight" is replaced by the word "mass".

### 3.5.2 Assumptions for calculating loading conditions

39 In paragraphs 3.5.2.5 and 3.5.2.6, the word "weight", wherever appears, is replaced by the word "mass".

## CHAPTER 4 - SPECIAL CRITERIA FOR CERTAIN TYPES OF SHIPS

### 4.1 Cargo ships carrying timber deck cargoes

39 In paragraph 4.1.3, in the introductory phrase, the expression "and 3.2" is added after "3.1.2.4".

40 In paragraph 4.1.3.3, in the first sentence, the words "be positive" are replaced by the words "not be less than 0.10 m" and the second sentence is deleted.

41 In paragraph 4.1.3, a new subparagraph .4 is added after existing subparagraph .3:

".4 When determining the ability of the vessel to withstand the combined effects of beam wind and rolling according to 3.2, the 16° limiting angle of heel under action of steady wind should be complied with, but the additional criterion of 80% of the angle of deck edge immersion may be ignored".

42 In paragraph 4.1.5.3.1, the words "should have" are replaced by the word "has".

### 4.2 Fishing vessels

43 In paragraph 4.2.3.1, in the second sentence, the word "it" is inserted after the word "should".

44 The existing text of paragraphs 4.2.4.1 and 4.2.4.2 is replaced by the following:

"4.2.4.1 The Administration may apply the provisions of 3.2 to fishing vessels of 45 m length and over.

4.2.4.2 For fishing vessels in the length range between 24 m and 45 m, the Administration may apply the provisions of 3.2. Alternatively the values of wind pressure (see 3.2.2.2) may be taken from the following table:

| h (m) | 1 | 2 | 3 | 4 | 5 | 6 and over |
|---|---|---|---|---|---|---|
| P (Pa) | 316 | 386 | 429 | 460 | 485 | 504 |

where h is the vertical distance from the centre of the projected vertical area of the ship above the waterline to the waterline."

45 In paragraph 4.2.5.1.2, the words "and a percentage of stores, fuel, etc., as agreed by the Administration" are added at the end.

46 In the heading of section 4.2.6, the expression "24 m" is replaced by "30 m".

### 4.5 Offshore supply vessels

47 In paragraph 4.5.3.1, in the first sentence, the word "standards" is inserted after the words "design and construction".

### 4.6 Mobile offshore drilling units (MODUs)

48 In the heading of paragraph 4.6.3, the word "wind" is inserted between the words "and" and "heeling".

49 In paragraph 4.6.5.2.1, in the second sentence, the words "equal or" are inserted after the words "must be", and in the definitions of Area "A" and Area "B", the word "arm" is replaced by the word "moment".

50 In paragraph 4.6.5.2.2, the expression "(GM cannot be taken to be greater than 2.44 m)" is moved to after the definition of parameter "*k*".

51 In paragraph 4.6.5.3, in the first definition of GM, the expression "restoring energy ratio" is replaced by the expression "reserve energy ratio".

52 In paragraph 4.6.5.5, in the equation for "a", the symbol, "$A_{min}$" is replaced by the symbol "$a_{min}$".

### 4.7 Pontoons

53 In paragraph 4.7.2.2.1, the word "unless" is replaced by the word "except".

54 In paragraph 4.7.2.2.3.3, the word "draught" is replaced by the words "mean draught".

55 In paragraph 4.7.3.1, the word "the" is inserted between the words "under" and "righting".

56 In paragraph 4.7.3.2, the expression "0.54 kPa" is replaced by "540 Pa".

### 4.8 Dynamically supported craft (DSC)

57 A new paragraph 4.8.1.3 is added after existing paragraph 4.8.1.2 as follows:

"4.8.1.3 The provisions of this chapter do not apply to any DSC the keel of which is laid, or which is subject to repairs, alterations or modifications of a major character, on or after 1 January 1996."

58 In paragraph 4.8.2.1.2, the word "damage" is replaced by the word "damaged".

59 In paragraph 4.8.3, the word "chapter" is replaced by the word "part".

60 In paragraph 4.8.6.2, the word "its" is inserted after the words "prior to".

61 In paragraph 4.8.7.1.1.4, the symbol "~~Ż~~" is replaced, wherever appears, by the symbol "~~Ż~~v".

62 In paragraph 4.8.7.1.2.3 and figure 4.8.7-3, the symbol "g" is replaced by the symbol "h".

### 4.9 Containerships greater than 100 m

63 In paragraph 4.9.2.6, in the definition of B, the symbol "B" is replaced by the symbol "$B_D$, the words "D'= moulded depth of the ship, corrected for defined parts of volumes within the hatch coamings according to the formula:" are inserted before the formula for "D' " and the explanation after "KG=" is replaced by the words "height of the centre of mass above base, corrected for free surface effect, not be taken as less than d, in m".

64 In paragraph 4.9.2.6, the following text is added at the end:

"$\ell_H$ = length of each hatch coaming within L/4 forward and aft from amidships, in m (see figure 4.9-1);

b = mean width of hatches within L/4 forward and aft from amidships, in m (see figure 4.9-1);

h = mean height of hatch coamings within L/4 forward and aft from amidships, in m (see figure 4.9-1);

L = length of the ship, in m;

B = breadth of the ship on the waterline, in m;

$B_m$ = breadth of the ship on the waterline at half draught, in m.

The shaded areas in figure 4.9-1 represent partial volumes within the hatch coamings considered contributing to resistance against capsizing at large heeling angles when the ship is on a wave crest."

65 In figure 4.9-1, the symbol "B/4" is replaced by the symbol $B_D$/4".

66 A new section 4.10 is added after existing section 4.9:

**"4.10 High-speed craft**

High-speed craft as defined in 1.3.9, constructed on or after 1 January 1996, to which chapter X of the International Convention for the Safety of Life at Sea, 1974 applies should comply with stability requirements of the HSC Code."

## CHAPTER 5 - ICING CONSIDERATIONS

### 5.5 Dynamically supported craft

67 In paragraph 5.5.1, in the second sentence, the word "for" is replaced by the word "of".

68 In the end of chapter 5, in the "CHART OF AREAS OF ICING CONDITIONS", the area north of latitude 56 °N in the Baltic Sea is shaded according to paragraph 5.3.2.1. (see the same chart in the 1993 Torremolinos Protocol).

## CHAPTER 6 - CONSIDERATIONS FOR WATERTIGHT INTEGRITY

### 6.4 Cargo ports and other similar openings

69 The following new paragraphs 6.4.3 and 6.4.4 are added after existing paragraph 6.4.2:

"6.4.3* Cargo port and other similar openings in passenger ships to which the International Convention for the Safety of Life at Sea, 1974 applies should comply with regulations II-1/17, 20 and 20-1 of this Convention. In addition, such openings in ro-ro passenger ships to which this Convention applies, should comply with regulation II-1/23-2 of this Convention.

6.4.4* Cargo port and other similar openings in cargo ships to which the International Convention for the Safety of Life at Sea, 1974 applies should comply with regulation II-1/25-10 of this Convention."

**6.5 Sidescuttles, window scuppers, inlets and discharges**

70 The existing text of paragraph 6.5.1 is replaced by the following:

"6.5.1* In passenger ships to which the International Convention for the Safety of Life at Sea, 1974 applies, openings in shell plating below the bulkhead deck should comply with regulation II-1/17 of this Convention.

Watertight integrity above the bulkhead deck should comply with regulation II-1/20 of this Convention.

In addition, in ro-ro passenger ships, watertight integrity below the bulkhead deck should comply with regulation II-1/20-2 and integrity of the hull and superstructure should comply with regulation II-1/23-2 of this Convention."

71 In paragraph 6.5.4.10, in the first sentence, the word "discharge" is replaced by the word "discharges".

72 The following new paragraph 6.5.5 is added after existing paragraph 6.5.4:

"6.5.5 In cargo ships to which the International Convention for the Safety of Life at Sea, 1974 applies, external openings should comply with regulation II-1/25-10 of this Convention."

**6.8 Freeing ports**

73 In paragraph 6.8.1, in the first sentence, the word "the" is inserted before the words "freeboard" and "working".

74 In paragraph 6.8.2.1, in the first sentence, the word "paragraphs" is replaced by the word "subparagraphs".

## CHAPTER 7 - DETERMINATION OF LIGHTSHIP DISPLACEMENT AND CENTRES OF GRAVITY

**7.3 Preparations for the inclining test**

75 The existing text of subparagraph .4 of paragraph 7.3.1.1 is replaced by the following:

".4 Measuring devices:

.1 pendulums – approximate location and length;

.2 U-tubes – approximate location and distance between legs;

.3 inclinometers - location and details of approvals and calibrations."

76 In paragraph 7.3.2.3, in the second sentence, the word "incline" is replaced by the word "inclining".

77 In paragraph 7.3.2.6, in the fourth sentence, the words "water specific gravity" are replaced by the words "specific gravity of water".

78 The existing text of paragraph 7.3.2.8 is replaced by the following:

"7.3.2.8 The total weight used should be sufficient to provide a minimum inclination of one degree and a maximum of four degrees of heel to each side. The Administration may, however, accept a smaller inclination angle for large ships provided that the requirements on pendulum deflection or U-tube difference in height in 7.3.2.9 are complied with. Test weights should be compact and of such a configuration that the vertical centre of gravity of the weights can be accurately determined. Each weight should be marked with an identification number and its weight. Re-certification of the test weights should be carried out prior to the inclining. A crane of sufficient capacity and reach, or some other means, should be available during the inclining test to shift weights on the deck in an expeditious and safe manner. Water ballast transfer may be carried out when it is impractical to incline using solid weights, if acceptable to the Administration."

79 In paragraph 7.3.2.9, the last two sentences are replaced by the following:

"One or more pendulums may be substituted by other measuring devices (U-tubes or inclinometers) at the discretion of the Administration. Alternative measuring devices should not be used to reduce the minimum inclining angles recommended in 7.3.2.8."

**7.4 Plans required**

80 In paragraph 7.4.2, the words "curves of form" and the parentheses are deleted.

81 The existing text of subparagraph .4 of paragraph 7.4 is replaced by the following :

".4 capacity plan showing capacities and vertical and longitudinal centres of gravity of cargo spaces, tanks, etc. When ballast water is used as inclining weights, the transverse and vertical centres of gravity for the applicable tanks, for each angle of inclination, must be available."

82 Existing section 7.6 is deleted from the chapter and its text is included in a new annex 3 (see

paragraph 94).

## ANNEX 1 - DETAILED GUIDANCE FOR THE CONDUCT OF AN INCLINING TEST

### 2.1 Free surface and tankage

83 In paragraph 2.1.1, in the first sentence, the word "it" is replaced by the word "they", in the second sentence, the word "incline" is replaced by the word "inclining", in the formula for free surface moment, the word "Free surface moment" are replaced by the symbol "$M_{fs}$" and in the formula for free surface correction and explanations thereto the symbol "FSM" is replaced by the symbol $M_{fs}$.

84 In paragraph 2.1.1, in the equation of the free surface moment, the word "Sum" is replaced by the summation sign "$\sum$".

85 At the end of paragraph 2.1.1, the following is added:

"When ballast water is used as inclining weight, the actual transverse and vertical movements of the liquid should be calculated taking into account the change of heel of the ship. Free surface corrections as defined in this paragraph should not apply to the inclining tanks."

86 The existing text of section 2.2 "Mooring arrangements" is replaced by the following:

"**2.2 Mooring arrangements**

The importance of good mooring arrangement cannot be over-emphasised. The arrangement selections will be dependent upon many factors. Among the most important are depth of water, wind and current effects. Whenever possible, the ship should be moored in a quiet, sheltered area free from extraneous forces such as propeller wash from passing ships, or sudden discharges from shore side pumps. The depth of water under the hull should be sufficient to ensure that the hull will be entirely free of the bottom. The tide conditions and trim of the ship during the test should be considered. Prior to the test, the depth of water should be measured and recorded in as many locations as necessary to ensure the ship will not contact the bottom. If marginal, the test should be conducted during high tide or the ship moved to deeper water.

2.2.1 Mooring arrangements should ensure that the ship will be free to list without restraint for a sufficient period of time to allow a satisfactory reading of the heeling angle, due to each weight shift, to be recorded.

2.2.2 The ship should be held by lines at the bow and the stem, attached to bollards and/or cleats on the deck. If suitable restraint of the ship cannot be achieved using deck fittings, then temporary padeyes should be attached as close as possible to the centreline of the ship and as near the waterline as practical. Where the ship can be moored to one side only, it is good practice to supplement the bow and stern lines with two spring lines in order to maintain positive control of the ship, as shown in figure 2.2.1. The leads of the spring lines should be as long as practicable. Cylindrical camels should be provided between the ship and the dock. All lines should be slack, with the ship free of the pier and camels, when taking readings.

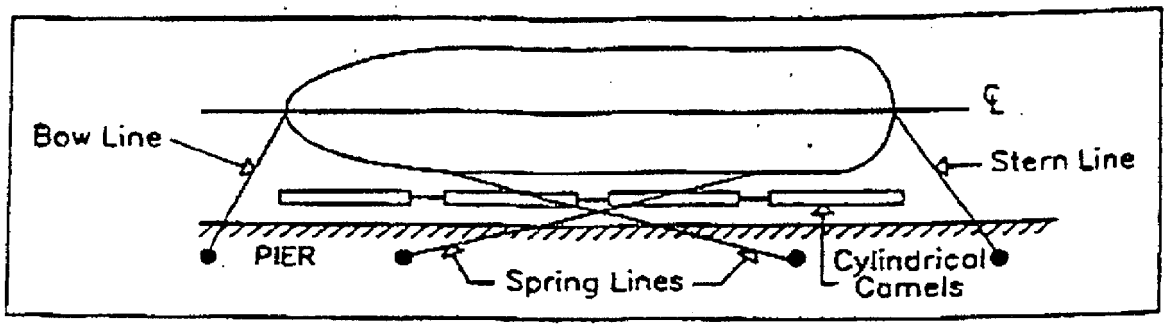


Figure 2.2.1

2.2.2.1 If the ship is held off the pier by the combined effect of the wind and current, a superimposed heeling moment will act on the ship throughout the test. For steady conditions this will not affect the results. Gusty wind or uniformly varying wind and/or current will cause these superimposed heeling moments to change, which may require additional test points to obtain a valid test. The need for additional test points can be determined by plotting test points as they are obtained.

2.2.2.2 If the ship is pressed against the fenders by wind and/or current, all lines should be slack. The cylindrical camels will prevent binding but there will be an additional superimposed heeling moment due to the ship bearing against the camels. This condition should be avoided where possible but, when used, consideration should be given to pulling the ship free of the dock and camels and letting the ship drift as readings are taken.

2.2.2.3 Another acceptable arrangement is where the combined wind and current are such that the ship may be controlled by only one line at either the bow or the stern. In this case, the control line should be led from on or near the centre line of the ship with all lines but the control line slack, the ship is free to veer with the wind and/or current as readings are taken. This can sometimes be troublesome because varying wind and/or current can cause distortion of the plot.

2.2.3 The mooring arrangement should be submitted to the approval authority for review prior to the test.

2.2.4 If a floating crane is used for handling inclining weights, it should not be moored to the ship."

**2.3 Test weights**

87 Paragraph 2.3.2 is deleted.

88 Existing paragraphs 2.3.3 to 2.3.5 are renumbered as paragraphs 2.3.2 to 2.3.4.

89 The existing text of the renumbered paragraph 2.3.4 is replaced by the following:

"2.3.4 Where the use of solid weights to produce the inclining moment is demonstrated to be impracticable, the movement of ballast water may be permitted as an alternative method. This acceptance would be granted for a specific test only, and approval of the test procedure by the Administration is required. As a minimal prerequisite for acceptability, the following conditions should be required:

.1 inclining tanks should be wall-sided and free of large stringers or other internal members that create air pockets. Other tank geometries may be accepted at the discretion of the Administration;

.2 tanks should be directly opposite to maintain ship's trim;

.3 specific gravity of ballast water should be measured and recorded;

.4 pipelines to inclining tanks should be full. If the ship's piping layout is unsuitable for internal transfer, portable pumps and pipes/hoses may be used;

.5 blanks must be inserted in transfer manifolds to prevent the possibility of liquids being "leaked" during transfer. Continuous valve control must be maintained during the test;

.6 all inclining tanks must be manually sounded before and after each shift;

.7 vertical, longitudinal, and transverse centres should be calculated for each movement;

.8 accurate sounding/ullage tables must be provided. The ship's initial heel angle should be established prior to the incline in order to produce accurate values for volumes and transverse and vertical centres of gravity for the inclining tanks at every angle of heel. The draught marks amidships (port and starboard) should be used when establishing the initial heel angle;

.9 verification of the quantity shifted may be achieved by a flowmeter or similar device; and

.10 the time to conduct the inclining must be evaluated. If time requirements for transfer of liquids is considered too long, water may be unacceptable because of the possibility of wind shifts over long periods of time."

**2.4 Pendulums**

90 In paragraph 2.4.1, the following new text is inserted before the last sentence:

"On large ships with high GM, pendulum lengths in excess of the length recommended above may be required to obtain the minimum deflection. In such cases, the trough, as shown in figure A1-2.4.6, should be filled with high viscosity oil."

91 In paragraph 2.4.7, the following sentence is added at the end of the paragraph:

"The Administration may approve an alternative arrangement when this is found impractical."

92 After paragraph 2.4.7, a new heading is inserted as follows:

**"2.5 U-tubes"**

93 Existing paragraph 2.4.8 is replaced by the following:

"2.5.1 The legs of the device should be securely positioned as far outboard as possible and should be parallel to the centreline plane of the ship. The distance between the legs should be measured perpendicular to the centreline plane. The legs should be vertical, as far as practical.

2.5.2 Arrangements should be made for recording all readings at both legs. For easy reading and checking for air pockets, clear plastic tube or hose should be used throughout. The U-tube should be pressure tested prior to the inclining test to ensure watertightness.

2.5.3 The horizontal distance between the legs of the U-tube should be sufficient to obtain a level difference of at least 15 cm between the upright and the maximum inclination to each side.

2.5.4 Normally, water would be used as the liquid in the U-tube. Other low viscosity liquids may also be considered.

2.5.5 The tube should be free of air pockets. Arrangements should be made to ensure that the free flow of the liquid in the tube is not obstructed.

2.5.6 When a U-tube is used as a measuring device, due consideration should be given to the prevailing weather conditions (see 4.1.1.3):

.1 if the U-tube is exposed to direct sunlight, arrangements should be made to avoid temperature differences along the length of the tube;

.2 if temperatures below 0°C are expected, the liquid should be a mixture of water and an anti-freeze additive; and

.3 where heavy rain squalls can be expected, arrangements should be made to avoid additional water entering the U-tube.

**2.6 Inclinometers**

The use of inclinometers should be subject to at least the following recommendations:

.1 the accuracy should be equivalent to that of a pendulum;

.2 the sensitivity of the inclinometer should be such that the non-steady heeling angle of the ship can be recorded throughout the measurement;

.3 the recording period should be sufficient to accurately measure the inclination. The recording capacity should be generally sufficient for the whole test;

.4 the instrument should be able to plot or print the recorded inclination angles on paper;

.5 the instrument should have linear performance over the expected range of inclination angles;

.6 the instrument should be supplied with the manufacturer's instructions giving details of calibration, operating instructions, etc.; and

.7 it should be possible to demonstrate the required performance to the satisfaction of the Administration during the inclining test."

94 A new annex 3 entitled "Determination of ship's stability by means of rolling period test (for ships up to 70 m in length)" including the text of existing section 7.6 is added (see paragraph 82).

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**ANNEX 3**

**DRAFT RESOLUTION MSC. [ ](69)**
**(adopted on [ 1998])**

**EXTENDED APPLICATION OF THE EXPLANATORY NOTES TO THE SOLAS REGULATIONS ON SUBDIVISION AND DAMAGE STABILITY OF CARGO SHIPS OF 100 M IN LENGTH AND OVER (RESOLUTION A.684(17))**

THE MARITIME SAFETY COMMITTEE,

RECALLING Article 28(b) of the Convention on the International Maritime Organization concerning the functions of the Committee,

RECALLING ALSO resolution A.684(17) on Explanatory notes to the SOLAS regulations on subdivision and damage stability of cargo ships of 100 m in length and over (Explanatory Notes) and that the Committee, in adopting the regulations contained in SOLAS chapter II-1 part B-1, invited Administrations to note that the regulations should be applied in conjunction with the aforementioned Explanatory Notes which were adopted by the Organization in order to ensure uniform application of the SOLAS regulations,

NOTING resolution MSC.47(66), by which the Committee, at its sixty-sixth session, adopted amendments to SOLAS chapter II-1 part B-1, concerning damage stability requirements for cargo ships of 80 m and over but less than 100 m in length, which are due to enter into force on 1 July 1998,

RECOGNIZING that, when the above amendments to SOLAS chapter II-1 part B-1 enter into force, there will be a need for explanatory notes applicable to cargo ships of 80 m and over but less than 100 m in length,

HAVING CONSIDERED, at its [sixty-ninth session], the recommendation made by the Sub-Committee on Stability and Load Lines and on Fishing Vessels Safety, at its forty-first session,

1. RESOLVES that the Explanatory Notes adopted by resolution A.684(17) should also apply to cargo ships of 80 m and over but less than 100 m in length;

2. INVITES Governments to apply the present resolution when implementing the regulations on subdivision and damage stability for such cargo ships, contained in the amendments to SOLAS chapter II-1 part B-1 adopted by resolution MSC.47(66).

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**ANNEX 4**

**DRAFT MSC CIRCULAR**

**GUIDELINES FOR SHIPBOARD LOADING AND STABILITY COMPUTER PROGRAMS**

1 The Maritime Safety Committee, at its [sixty-ninth session (11 to 20 May 1998)], approved Guidelines for shipboard loading and stability computer programs, set out in the annex, aiming at ensuring that as new programs are developed and introduced into service, they do not overlook potential vulnerabilities which can inadvertently cause human error problems. The Guidelines should be applied where computer-based systems are used to perform functions to assist operators in monitoring and verifying specific conditions and performance of the ship.

2 The Committee decided that the Guidelines should be improved in the future, on the basis of new technological developments and in the light of experience gained from their application.

3 Member Governments are invited to bring the Guidelines to the attention of interested parties of the shipping industry as they deem appropriate.

ANNEX

# GUIDELINES FOR SHIPBOARD LOADING AND STABILITY COMPUTER PROGRAMS

## 1 Scope

These guidelines may be applied where computer-based systems are used to perform functions, such as:

- predicting draughts and trim and verifying that limiting stability parameters, such as "required $GM_T$" are met;

- tank instrumentation systems used to provide direct electronic input of liquid loads (cargo, fuel, ballast, etc.) into the computer, bypassing the human measurement and data entry steps;

- operators of containerships may want to verify that over-the-bow bridge visibility requirements are met;

- operators of chemical parcel tankers may want to integrate chemical compatibility data to create voyage-specific/cargo-specific loading plans, thereby optimizing cargo flexibility;

- similarly, OBO operators may want a system which can accommodate multiple bulk cargoes of different densities and compute bending stresses with more precision;

- a program system could be used to monitor real-time hull bending stresses during loading/discharging operations, or due to sea conditions while under way via sensor systems that provide direct input to the computer; and

- a calculating damage stability conditions integrating loading data and flooded compartment characteristics.

## 2 General requirements

2.1 *Units:* Basic stability calculations are performed using weights, typically Ltons or Mtons. However, some cargoes are more commonly measured in short tons, TEUs, or barrels. Other liquid loads (fuel and ballast) might be initially measured as soundings or ullages. The program developer may wish to make its program more convenient for the user to enter data in these alternate units. If so, the program should minimize chances for unit confusion and, wherever possible, weight conversions should be calculated by the computer. Screen displays and print-outs should then present both the entered value and the computational weight value side-by-side.

2.2 *Data and program protection:* Although the program should be flexible enough to allow the user to override default data, certain data, such as lightship characteristics, allowable bending stress, required GM, as well as the program itself, should be protected against user revision. This could be achieved by furnishing the ship with compiled or read-only versions.

2.3 *Back-up of data:* Copies of all constant data residing in computer files, such as ship geometry and tables, should be available on independent storage units, such as tape of floppy disks. The number of such copies should not be less than two.

## 3 User interface

3.1 *"Home" screen:* The program should have a simple command (keystroke/icon) that returns the user directly to a familiar "home" screen from any of the loading screens. This allows a "lost" user (who may have got disoriented among various loading screens) to quickly re-establish their orientation.

3.2 *"Help" functions*: The program should have easily-accessed "help" functions such as designated function keys, or an on-screen menu bar.

3.3 *Default loading:* A default loading condition should reflect any special loading or operating requirements imposed by the ship's stability booklet (such as locked-in ballast requirements).

3.4 *Input and output data screening*: The program should check data entered by the user for reasonableness in order to screen out possible input errors, for example, a cargo tank entry which exceeds the capacity of the tank. The program should not reject the entry as there may be special loading scenarios where unusual data must be entered, but it should clearly indicate to the user that the entry is out of expected bounds. Similarly, the program should alert the user if an output parameter such as "predicted GM" is out of expected bounds.

3.5 *Alerts:* The system should alert the user if an output indicates a critical, or possibly dangerous situation. Alerts should, when possible, be augmented by audio signals. It is recommended that the graphical presentation and audio signals are different in case of critical events and user errors.

3.6 *Extra loading entry lines:* In most cases, load entries will be of the fixed-location type where LCGs, VCGs, etc., are pre-displayed and the user only needs to enter a weight value. However, the program should include several extra blank lines to allow additional non-fixed load entries where the user can enter VCG, LCG, TCG, etc. Examples of non-fixed load entries might be an unusual deck cargo, temporary ballast or damaged stability calculations (where a flooded compartment could be entered as if it were a tank).

3.7 *Print-outs:* Each loading condition print-out should automatically contain the name of the ship and the date of print-out; user should be prompted to enter a title for the condition as well. This information should be repeated on each page of the print-out.

## 4 Training and documentation

4.1 *User training*: Training/tutorial material should be provided, as appropriate, for the sophistication of the program. This may range from formal classroom sessions to tutorial videotapes and/or self-study lesson plans.

4.2 *Documentation:* The software should be accompanied by a user's manual and a programmer's manual.

4.2.1 The user's manual should be written for the direct user (ship's officers) and should include the following elements:

.1 *Identification*: the manual should have a unique identification number that matches an on-screen ID number in the program. It should also clearly identify the stability booklet from which the lightship data is taken.

.2 *System requirements:* identifies computer system hardware and software requirements such as compatible computers, operating system, memory requirements and other special requirements, such as video graphics, mouse, printer, etc.

.3 *File management:* a list of all relevant software files, giving name, size, date and a brief description of each. The manual should also explain how any user-generated files, such as saved loading conditions, are named. These measures should allow the user to review the disk directory and verify that the correct current files are present.

.4 *Instructions:* a clear explanation of how to install, use, and troubleshoot the program. The instructions should be user-friendly, recognizing that the user is a ship officer.

.5 *Information sources:* a list of all ship-specific plans, drawings, tables, other documents, etc., which provided information used in the program. In most cases, this information will probably come from the ship's approved stability booklet; however, other sources should be clearly identified. Ideally, all such information sources should themselves be annotated to the effect that they were used in developing the program (so that future revisions to the drawing will also prompt a review of the program).

4.2.2 *The programmer's manual* is not expected to be furnished to the ship; it is for use by select persons familiar with programming (but who may not necessarily the original program writers) when it becomes necessary to revise the program as a consequence of changes to the ship. The programmer's manual should carefully document the program's workings, and include a flowchart and an annotated program listing. This manual should explain how to edit the program, especially to revise ship-specific data (lightship data, hydrostatic characteristics, weight and moment data, tank capacities, etc.).

4.3 *Program and documentation control:* A careful procedure should be established so that revisions to the program are properly tracked and forwarded to the ship. Each revision delivered to the ship should include change pages to the user's manual and instructions on how to delete obsolete files and install replacement (revised) files. The process should include an "action complete" report back to shoreside management.

## 5 Program functionality

*Program functionality:* A manner for independently verifying the program's functioning should be provided. Ideally, the opening screen (when the program is first brought up) should present a self-diagnostic report on program functioning. Alternatively, a range of sample loading conditions can be furnished (on paper) which can be manually entered into the program for comparison with correct draughts, trim and available GM. The sample conditions may be the same as found in the ship's approved stability booklet, or separate samples included in the program's user manual.

## ANNEX 5

## DRAFT GUIDELINES FOR DAMAGE CONTROL PLANS

### 1 Application

These guidelines are intended as advice on the preparation of damage control plans for passenger and cargo ships to which SOLAS regulations II-1/23, II-1/23-1 and II-1/25-8 apply.

### 2 General

2.1 The damage control plan and damage control booklet are intended to provide ship's officers with clear information on the ship's watertight compartmentation and equipment related to maintaining the boundaries and effectiveness of the compartmentation so that, in the event of damage to the ship causing flooding, proper precautions can be taken to prevent progressive flooding through openings therein and effective action can be taken quickly to mitigate and, where possible, recover the ship's loss of stability.

2.2 The damage control plan and damage control booklet should be clear and easy to understand. It should not include information which is not directly relevant to damage control, and should be provided in the language or languages of the ship's officers. If the languages used in the preparation of the plan and booklet are not one of the official languages of the SOLAS Convention, a translation into one of the official languages should be included.

### 3 Damage control plans

3.1 The damage control plan should be of a scale adequate to show clearly the required content of the plan, but not less than a 1:200 scale.

3.2 Isometric drawings are recommended for special purposes. The plan should include inboard profile, plan views of each deck and transverse sections to the extent necessary to show the following:

.1 the watertight boundaries of the ship;

.2 the locations and arrangements of cross-flooding systems, blow-out plugs and any mechanical means to correct list due to flooding, together with the locations of all valves and remote controls, if any;

.3 the locations of all internal watertight closing appliances including on ro-ro ships, internal ramps or doors acting as extension of the collision bulkhead and their controls and the locations of their local and remote controls, position indicators and alarms. The locations of those watertight closing appliances which are not allowed to be opened during the navigation and of those watertight closing appliances which are allowed to be opened during navigation, according to SOLAS regulation II-1/15, should be clearly indicated;

.4 the locations of all doors in the shell of the ship, position indicators, leakage detection and surveillance devices;

.5 the locations of all weathertight closing appliances in local subdivision boundaries above the bulkhead deck and on the lowest exposed weather decks, together with locations of controls and position indicators, if applicable;

.6 the locations of all bilge and ballast pumps, their control positions and associated valves;

and

.7 pipes, ducts or tunnels, if any, through which limited progressive flooding has been accepted by the Administration.

## 4 Damage control booklets

4.1 The information listed in section 3 should be repeated in the damage control booklet which should also contain stability consequence diagrams.

4.2 The damage control booklet should include general instructions for controlling the effects of damage, such as:

.1 immediately closing all watertight and weathertight closing appliances;

.2 establishing the locations and safety of persons on board, sounding tanks and compartments to ascertain the extent of damage and repeated soundings to determine rates of flooding; and

.3 cautionary advice regarding the cause of any list and of liquid transfer operations to lessen list or trim, and the resulting effects of creating additional free surfaces and of initiating pumping operations to control the ingress of water.

4.3 The booklet should contain additional details to the information shown on the damage control plan, such as the locations of all sounding devices, tank vents and overflows which do not extend above the weather deck, pump capacities, piping diagrams, instructions for operating cross-flooding systems, means of accessing and escaping from watertight compartments below the bulkhead deck for use by damage control parties, and alerting ship management and other organizations to standby and to co-ordinate assistance, if required.

4.4 If applicable to the ship, locations of non-watertight openings with non-automatic closing devices through which progressive flooding might occur should be indicated as well as guidance on the possibility of non-structural bulkheads and doors or other obstructions retarding the flow of entering seawater to cause at least temporary conditions of unsymmetrical flooding.

4.5 If the results of the subdivision and damage stability analyses are included, additional guidance should be provided to ensure that the ship's officers referring to that information are aware that the results are included only to assist them in estimating the ship's relative survivability.

4.6 The guidance should identify criteria on which the analyses were based and clearly indicate that the initial conditions of the ship's loading extents and locations of damage, permeabilities, assumed for the analyses may have no correlation with the actual damaged condition of the ship.

4.7 To enable the master to evaluate the consequence of damage to the ship, stability consequence diagrams should be provided, a sample of which is contained in the annex.

4.8 There should be a limited number of stability cnsequence diagrams which relate to the damage control plan, conveniently kept in the damage control booklet for use in the event of emergency.

4.9 Taking into account that no such diagrams could address all possible loading conditions, it should reflect as a minimum the calculated cases for the attained subdivision index A specified in SOLAS chapter II-1.

4.10 Stability consequence diagrams are intended to provide simple visual guidance, and be colour-coded for quick reference.

4.11 The stability consequence diagrams should contain, as a minimum, a profile of the ship, with detail of the watertight integrity. The diagrams should refer to the relevant part of the damage control booklet.

4.12 For cargo ships and passenger ships, the colour codes should be based on the survivability factor "s"[2] and defined as follows:

| Colour | Condition | Factor "s" |
|---|---|---|
| Green | Safe | $s \geq 1.0$ |
| Yellow | Marginal | $0.25 < s < 1.0$ |
| Red | Critical | $s \leq 0.25$ |

## 5 Use of on-board computers

Damage control plans and damage control booklets should be in printed form. The use of on-board computers[3], with damage stability software developed for the specific ship, and familiar to properly trained ship's officers can provide a rapid means to supplement the information in the planned booklet for effective damage control.

## 6 Placement on board the ship

6.1 For passenger ships, the damage control plan should be permanently exhibited on the navigation bridge, as well as in the ship's safety centre, or equivalent.

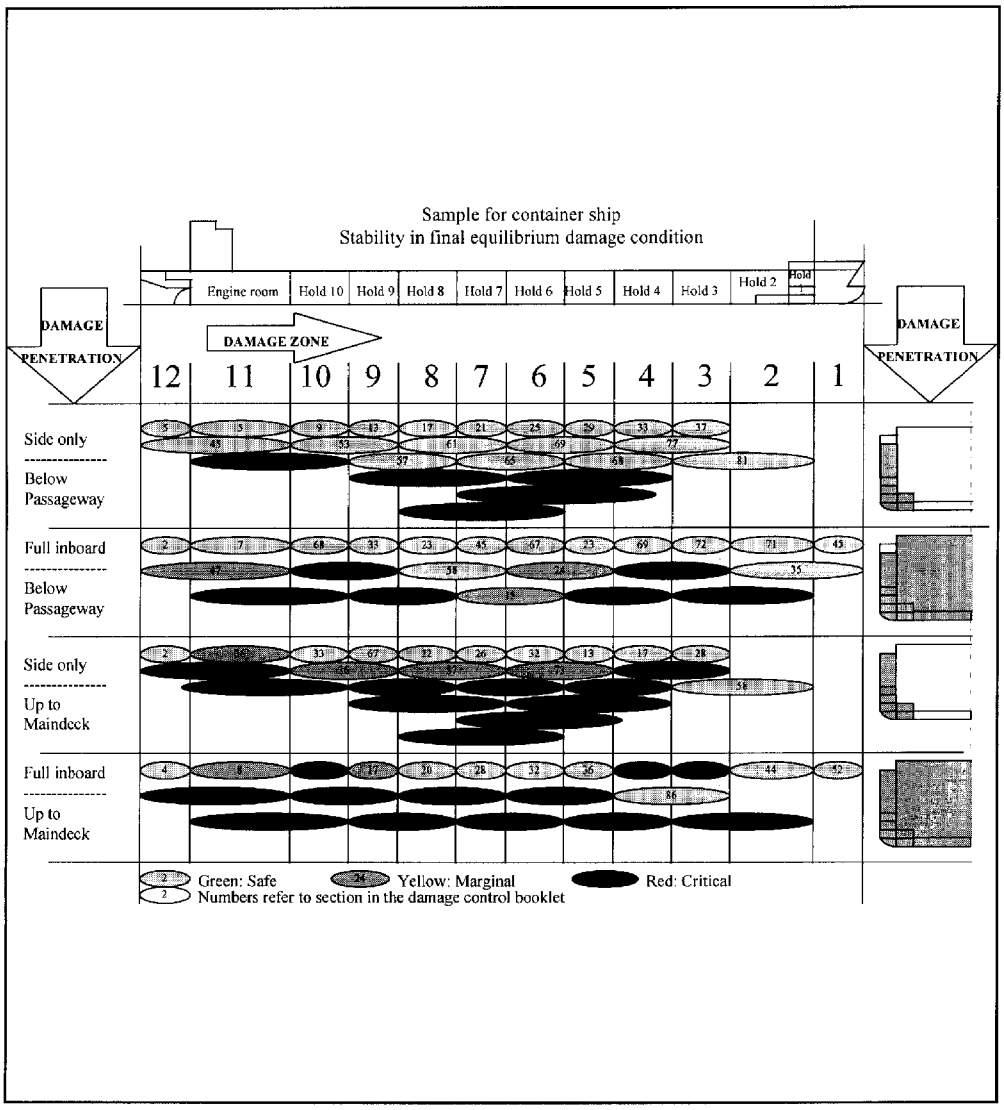
6.2 For cargo ships, the damage control plan should be permanently exhibited or readily available on the navigation bridge. Furthermore, the damage control plan should be permanently exhibited or readily available in the cargo control room.

[2] As defined in SOLAS regulation II-1/25-6.

[3] Refer to the Guidelines for the on-board use and application of computers, to be developed by the Organization.

ANNEX

**STABILITY CONSEQUENCE DIAGRAM**

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**ANNEX 6**

**REVISED WORK PROGRAMME OF THE SUB-COMMITTEE AND PROVISIONAL AGENDA FOR SLF 42**

**Revised work programme of the Sub-Committee**

| | | Target completion date | Reference |
|---|---|---|---|
| 1 | Analysis of intact stability casualty rec | C | SLF 30/18, paragraphs 4.16 and 4.17 |
| 2 | Analysis of damage car | C | SLF 41/18, paragraphs 17.4 and 17.5 |
| 3 | Improved stability criteria and systematic model tests | Continuous | SLF 39/18, paragraph 15.4 and annex 7 |
| H.1 | Harmonization of damage stability provisions in IMO instruments (probabilistic method) | | |
| | ~~.1 explanatory notes for cargo ships of less than 100 m in length~~ | ~~1998~~ | SLF 41/18, section 4 |
| | ~~.2~~.1 development of revised SOLAS chapter II-1 parts A, B and B-1 | 1999 | SLF 41/18, section 5 |
| | .2 development of explanatory notes for harmonized SOLAS chapter II-1 parts A, B and B-1 | 2 sessions | SLF 41/18, section 5.7 |
| H.2 | **Revision of technical regulations of the 1966 LL Convention** | ~~1999~~ 2000 | SLF 41/18, paragraph 6.13 |
| H.3 | **Revision of the fishing vessel Safety Code and Voluntary Guidelines** | 1999 | SLF 41/18, section 7 |
| H.4 | Role of the human element in maritime casualties | | |
| | ~~.1 guidelines for shipboard loading and stability computer programs~~ | ~~1998~~ | SLF 41/18, section 8 |
| | ~~.2~~.1 **guidelines for damage control plans** | ~~1998~~ 1999 | SLF 41/18, section 9 |
| H.5 | **Revision of the HSC Code** (co-ordinated by DE) | 1999 | MSC 66/24, paragraph 21.27; SLF 41/18, section 10 |

Note: 1. "H" means a high priority item and "L" means a low priority item. However, within the high and

low priority groups, items have not been listed in any order of priority.

2. The striked-out text indicates proposed deletions and the shaded text shows proposed additions or changes.

| | | Target completion date/number of sessions needed for completion | Reference |
|---|---|---|---|
| ~~H.7~~ | ~~Requirements for existing one-compartment-standard passenger ships carrying 400 persons or more~~ | ~~1999~~ | SLF 41/18, section 12 |
| H.6 | **Amendments to the DSC Code : damage stability requirements for existing ro-ro passenger craft** | 2000 | SLF 41/18, paragraph 10.3.1 |
| H.7 | **Guidance for shipboard stability management** | 2000 | SLF 41/18, paragraph 3.7 |
| H.8 | **Interpretations of the 1966 LL Convention** | 1999 | SLF 41/18, paragraph 6.6 |
| L.1 | **Model stability booklets and loading manuals** | 1999 | SLF 41/18, section 11 |
| L.2 | Harmonization of damage stability provisions in IMO instruments (probabilistic method) | | |
| | .1 harmonization of damage stability provisions in other IMO instruments, including the 1993 Torremolinos Protocol | ~~1998~~ 3 sessions | SLF 37/25, paragraph 22.2; MSC 65/25, paragraph 21.23; SLF 41/18, section 13 |
| | ~~.2 feasibility of regulations for cargo ships of less than 80 m in length~~ | ~~1998~~ | SLF 41/18, section 14 |
| L.3 | **Development of a code on polar navigation** (co-ordinated by DE) | ~~2 sessions~~ 2000 | MSC 68/23, paragraph 20.4; SLF 41/18, paragraphs 16.2 and 16.4 |
| L.4 | **Recommendations for the installation of partially weathertight hatchway covers on board containerships** | ~~2 sessions~~ 2000 | MSC 68/23, paragraph 20.60; SLF 41/18, paragraph 16.4 |
| ~~H.6~~ L.5 | Review of the Intact Stability Code | ~~1998~~ continuous | SLF 41/18, paragraph 3.14 |

**Provisional agenda for SLF 42**[****]

| | |
|---|---|
| | Opening of the session |
| 1 | Adoption of the agenda |
| 2 | Decisions of other IMO bodies |
| 3 | Development of revised SOLAS chapter II-1 parts A, B and B-1 |
| 4 | Revision of technical regulations of the 1966 LL Convention |
| 5 | Revision of the HSC Code |
| 6 | Guidelines for damage control plans |
| 7 | Revision of the fishing vessel safety Code and voluntary Guidelines |
| 8 | Model stability booklets and loading manuals |
| 9 | Amendments to the DSC Code: damage stability requirements for existing ro-ro passenger craft |
| 10 | Guidance for shipboard stability management |
| 11 | Interpretations of the 1966 LL Convention |
| 12 | Development of a code on polar navigation |
| 13 | Recommendations for the installation of partially weathertight hatchway covers on board containerships |
| 14 | Election of Chairman and Vice-Chairman for 2000 |
| 15 | Work programme and agenda for SLF 43 |
| 16 | Any other business |
| 17 | Report to the Maritime Safety Committee |

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[****]Agenda item numbers do not necessarily indicate priority.

**ANNEX 7**

**DRAFT MSC CIRCULAR**

**INTERNATIONAL CONVENTION FOR THE SAFETY OF LIFE AT SEA, 1974, AS AMENDED**

**Interpretation of the position of the forward perpendicular for the purpose of SOLAS regulation II-1/10**

1 The Maritime Safety Committee, at its [sixty-ninth session (11 to 22 May 1998)], noted that on some ships the position of the forward perpendicular had been altered by the addition of a steel plate or very light steel structure between the stem and the bulbous bow, which altered the position of the intersection of the stem with the waterline thereby altering the position of the forward measuring point. In the case of such ships, it resulted in bulkheads and bow ramps, which in the first instance would appear to be wrongly located according to SOLAS regulation II-1/10 before these modifications, being deemed by Administrations to be correctly located. The Committee considered that such a practice was not within the spirit of SOLAS regulation II-1/10 and agreed to the following interpretation of the position of the forward perpendicular for the purpose of SOLAS regulation II-1/10:

> "The forward perpendicular should be coincident with the foreside of the stem on the deepest subdivision load line, where the stem is the contour of the outer surface of the hull at the forward end and excludes any appendages except a bulbous bow."

2 Member Governments are invited to use the above interpretation when applying SOLAS regulation II-1/10 and to bring this interpretation to the attention of parties concerned.

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